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(54) Apparatus for co-moulding plastic materials

(57) Described herein is an apparatus for the production of co-moulded products made of plastic material, made up, among other things, of a mobile base (3) comprising axially sliding extractors, two of which are normal extractors whilst a third is a delayed extractor formed by two single extractors coupled together (20, 21), and a first-forming die (9) set above the mobile base (3); the first delayed extractor (20) is active and has a tooth (23) on its side wall, slidingly received in a seat (24), made in the wall of the second passive extractor (21) facing the first extractor (20); the second passive extractor (21) has a tooth (25) on its side wall, slidingly received in a seat (26), made in the wall of the mobile base (3), against which said second extractor (21) is slidingly housed.

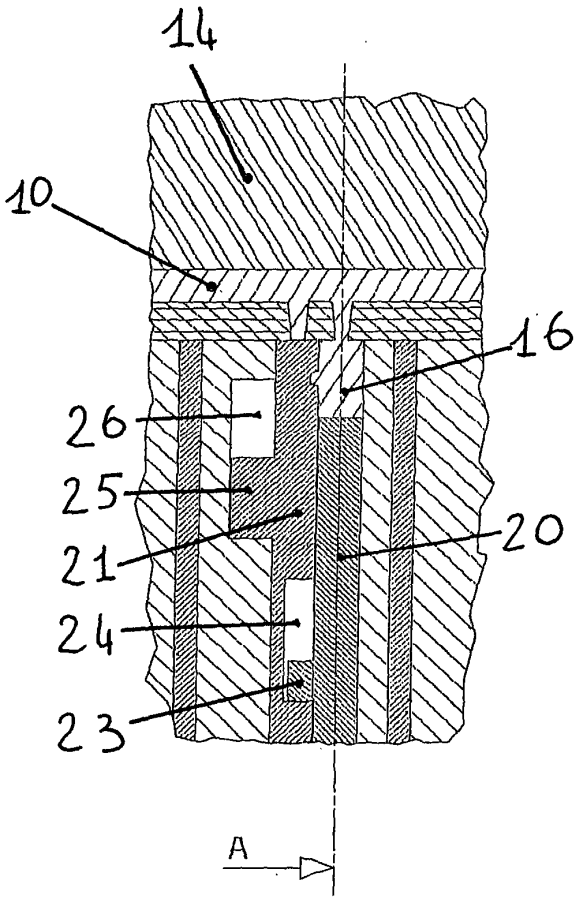

FIG. 8

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Description

[0001] The present invention relates to an apparatus for co-moulding items made of plastic material. In particular, the invention regards the production of items made of plastic to be used on motor vehicles, which bear a symbol, a logo, or else a particular graphic sign visible on the outer surface.

[0002] The main drawback of the current apparatuses used so far for co-moulding plastic materials consists in the fact that it may happen that, in the step of expulsion of the waste material from the mould, some parts are not totally expelled, with consequent problems of accumulation of material in the step of moulding of the next piece.

[0003] Such a drawback may be encountered with the apparatus indicated in the drawings and in the ensuing description by the definition of "known art".

[0004] The purpose of the present invention is to overcome the aforesaid drawbacks by proposing a co-moulding apparatus with systems for expulsion of the waste material that will enable no residue of material to be left within the mould.

[0005] Said purpose is achieved by the present invention, the subject of which is an apparatus for co-moulding plastic material that has the characteristics specified in Claim 1.

[0006] Further characteristics and advantages will emerge clearly from the ensuing description referred to the attached plates of drawings, which are provided by way of non-limiting example and in which:

- Figures 1 to 6 illustrate a method of co-moulding obtained with an apparatus of the known art represented in schematic form; and
- Figures 7 to 11 illustrate a method of co-moulding obtained with an apparatus according to the present invention, represented in schematic form.

[0007] With reference to Figures 1 to 6, designated as a whole by 2 is an apparatus for co-moulding plastic material according to the known art, said apparatus being made up of a mobile base 3, comprising, in the example illustrated, axially sliding extractors, two of which are normal extractors 4 and 5, whilst a third is a delayed extractor 6. Set above the mobile base is a first-forming die 9, whilst visible between the mobile base 3 and the first-forming die 9 is the first piece of moulded material 10 (Figure 2). Present in the wall of the sliding seat of the delayed extractor 6 made in the mobile base 3 is a recess 12 open towards the extractor and made in the proximity of the top wall 13 of said mobile base 3.

[0008] Designated by 14 in Figure 3 is a second-forming die that rests on the first moulded piece, whilst designated by 16 is the second piece of plastic material that is co-moulded with the first piece 10.

[0009] In this step of the operations, the delayed extractor 6 is made to fit within the mobile part 3 for a length of travel such as to leave the recess 12 exposed, which, during the operation of co-moulding, is filled with the plastic material of the second-forming piece which also fills the entire compartment left free by the set-in extractor 7, forming a piece 16 that constitutes the processing waste.

[0010] In the next step, illustrated in Figure 4, the extractors 4 and 5 push the co-moulded piece upwards whilst the waste piece 16, detaching from the co-moulded piece, remains within the mobile base 3, withheld therein by the undercut constituted by the recess 12. The co-moulded piece can now be removed from the mould, whilst the piece 16 is extracted from the base by means of the delayed extractor 6 (Figures 5 and 6). It is precisely in this step that part of the plastic material can remain within the recess 12, being torn away from the piece 16 during its expulsion from the mobile base 3.

[0011] It is clear that said remains vitiate the success of the next co-moulding.

[0012] The aforesaid drawback is prevented using, for the method of co-moulding described previously, an apparatus according to the present invention. In the ensuing description, the parts of the new apparatus which are the same as those of the apparatus of the known art will be designated by the same numbers. Consequently, the apparatus according to the invention illustrated in the figures is made up of a mobile part 3 englobing the axially sliding extractors, two of which are normal extractors 4 and 5, whilst a third is a newly designed delayed extractor constituted by two single extractors 20 and 21 coupled together, one active (20), i.e., controlled by an actuator (not represented), and the other passive, i.e., drawn along by the first extractor or else pushed by a projection 22 present in the first-forming die 9 (Figure 7). It is clear that the number of the extractors, whether normal or delayed, depends upon the shape and the symbols or wordings that it is desired to obtain in the co-moulded piece. In the case illustrated, for the purpose of facilitating understanding and illustration, the extractors are just three, two normal ones and one delayed. The first active delayed extractor 20 has a projection or tooth 23 on its side wall, said tooth being received in a seat 24 having a substantially rectangular longitudinal section, made in the wall of the second passive extractor 21 facing the first extractor 20. The second passive extractor 21 in turn has a projection or tooth 25 on its side wall, received in a seat 26 of a substantially rectangular longitudinal section, made in the wall of the mobile base 3, against which said second extractor 21 slides. Set above the mobile part is the first-forming die 9, whilst visible between the mobile part 3 and the die 9 is the first piece of moulded material 10 (Figure 2). Made in the wall of the passive delayed extractor 21 facing the extractor 20 and against which said extractor slides, in the proximity of the top wall 27 of said delayed extractor 21, is a recess 12 open towards the wall of the extractor.

[0013] The operations to be performed for obtaining a co-moulded product are substantially the same as those described previously for the apparatus of the known art, up to the step in which the extractors 4 and 5 push the

co-moulded piece upwards, and the waste piece 12 remains in a position withheld by the recess 12. The only appreciable difference consists in the fact that the extractor 20 slides downwards until the tooth 23 comes to bear upon the bottom wall of the recess 24, and this to enable the formation of the piece 16 that will subsequently be torn away to enable formation of the graphic sign or wording co-moulded on the surface. In the next step, the delayed extractor 20 is activated with a thrust upwards, which brings about sliding of the piece 16, once again upwards, and draws along the second extractor 21 via the material of the piece 16 that has come to fill the cavity 12 in the wall of the second extractor. Said passive extractor terminates its travel when the tooth 25 comes to bear upon the front wall of the recess 26, whilst the first extractor terminates its travel when the tooth 23 comes to bear upon the front wall of the recess 24 made in the extractor 21.

[0014] In the meantime, the piece 16, which has come out of the base 3, drawing along with it the second extractor 21, is free to detach from the recess 12 and fall out of the apparatus without leaving any residue of material therein and in particular in the recess 12, it no longer being forced against it by the inner wall of the base 3. This new embodiment of the active and passive delayed extractors 20 and 21, consequently enables innumerable co-moulded pieces to be obtained without there being accumulation of waste material within the mould. Of course, the shape of the extractors is not binding for the purposes of the invention, and said extractors may be made with different shapes, without thereby departing from the sphere of protection defined by the annexed claims.

Claims

1. An apparatus for the production of co-moulded products made of plastic material made up, among other things, of a mobile base (3) comprising axially sliding extractors, at least one (4, 5) of which is a normal extractor and at least one (6) of which is a delayed extractor; a first-forming die (9) being set above the mobile base (3), said apparatus being **characterized in that** the delayed extractor (6) is formed by two single extractors (20, 21) coupled together, a first active delayed extractor (20), which has a tooth (23) on its side wall, slidingly received in a seat (24), made in the wall of the second extractor (21) facing the first extractor (20), and a second passive delayed extractor (21), which has a tooth (25) on its side wall, slidingly received in a seat (26), made in the wall of the mobile base (3), against which said second extractor (21) is slidingly housed.

2. The apparatus for the production of co-moulded products according to Claim 1, **characterized in that** the seats (24, 26), received in which are the two teeth (23, 25) of the single extractors (20, 21) have a substantially rectangular longitudinal section.

3. The apparatus for the production of co-moulded products according to Claim 1, **characterized in that** made in the wall of the passive delayed extractor (21) facing the active extractor (20) and against which said extractor slides, is a recess (12) open towards the wall of the active extractor and made in the proximity of the top wall (27) of said delayed extractor (21).

4. The apparatus for the production of co-moulded products according to Claim 1, **characterized in that** the two single delayed extractors (20, 21) are designed to slide individually or coupled together within the mobile base (3).

5. The apparatus for the production of co-moulded products according to Claims 1 and 3, **characterized in that** the passive extractor (21) is set in motion by the active extractor (20) via a waste piece (16) partially inserted in the recess (12).

6. The apparatus for the production of co-moulded products according to Claim 1, **characterized in that** the passive extractor (21) is pushed downwards via a projection (22) made in the first-forming die (9).

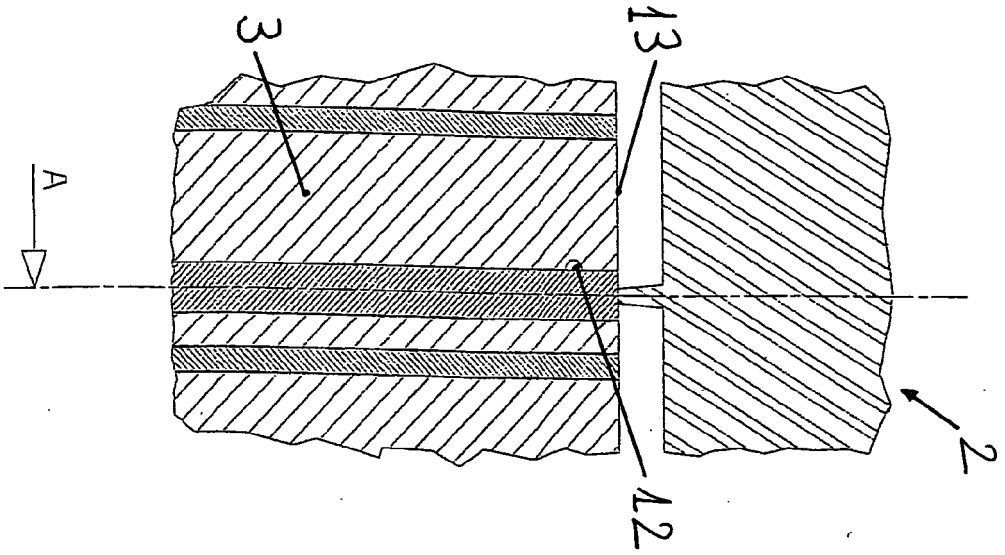


FIG. 1

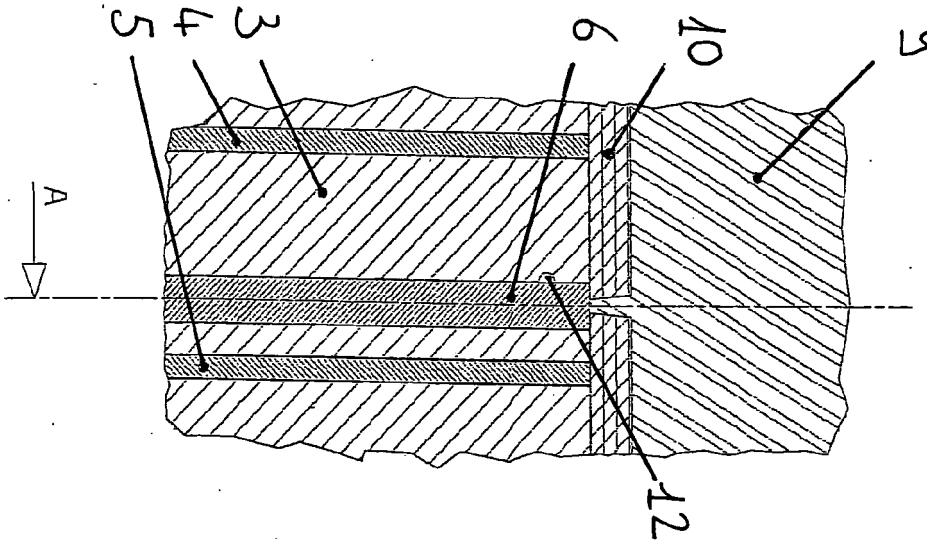


FIG. 2

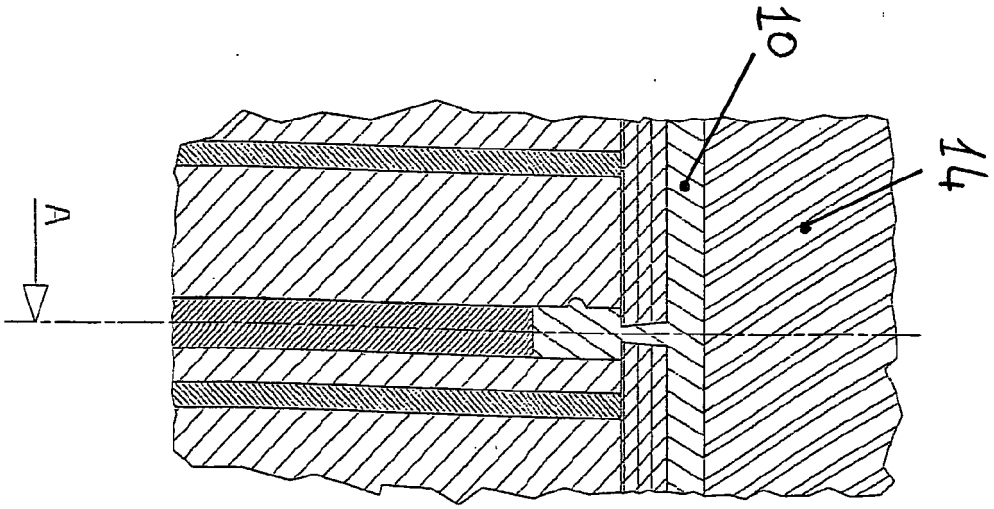


FIG. 3

FIG. 4

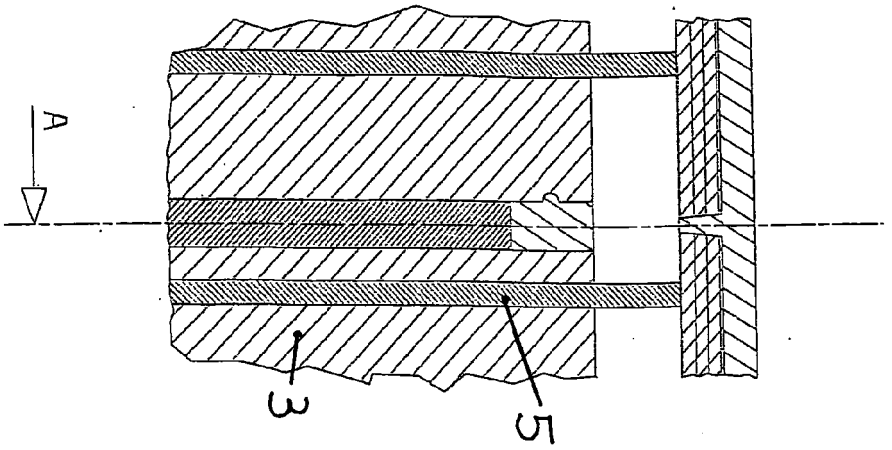


FIG. 5

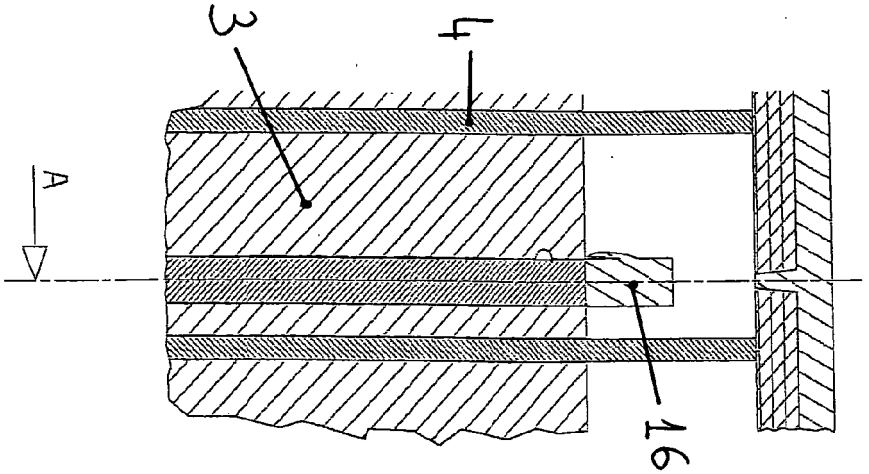
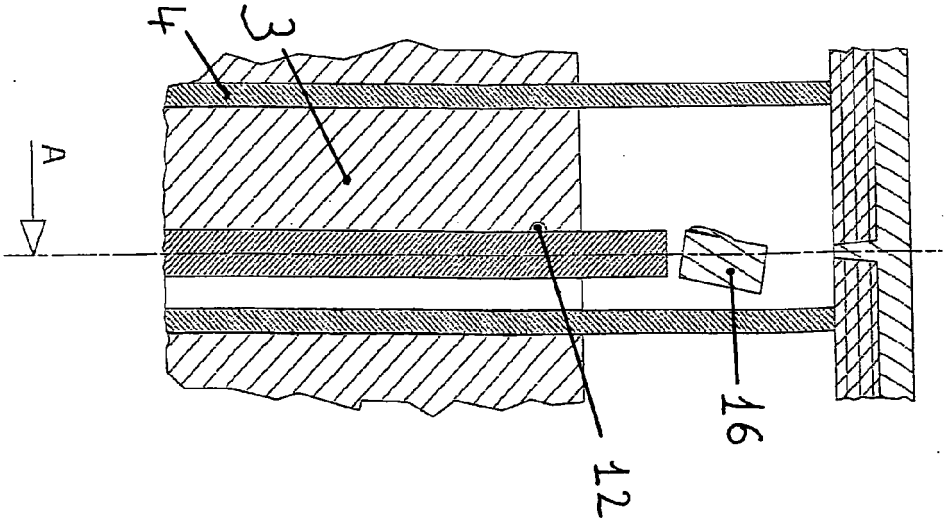


FIG. 6



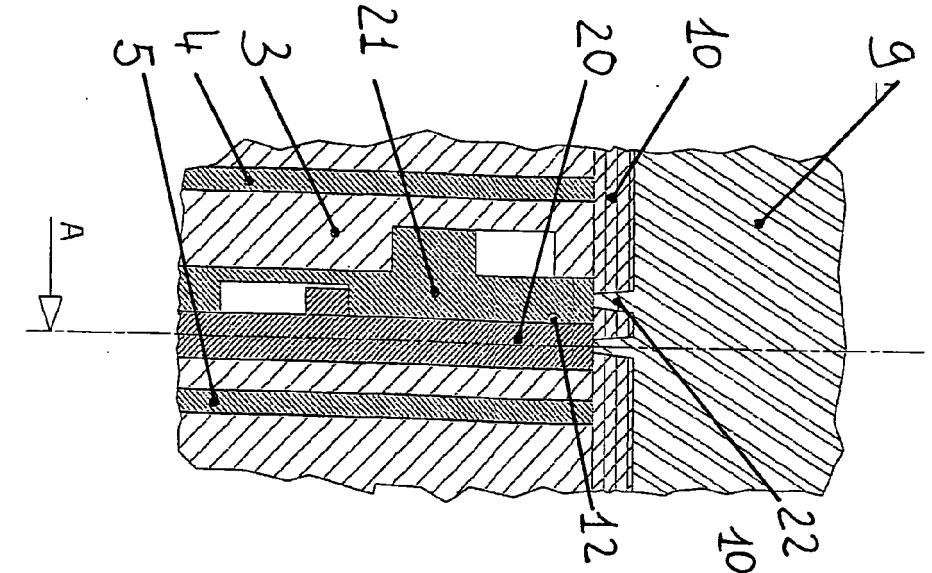


FIG. 7

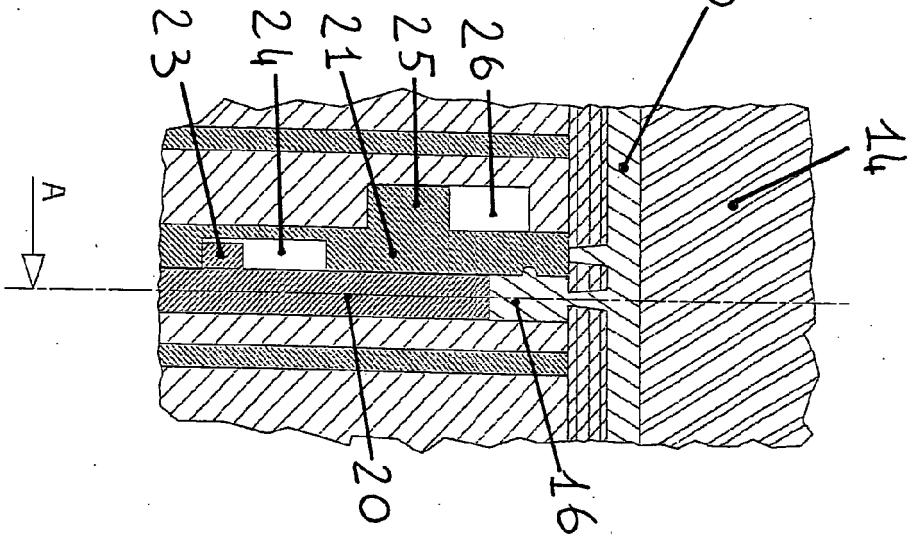


FIG. 8

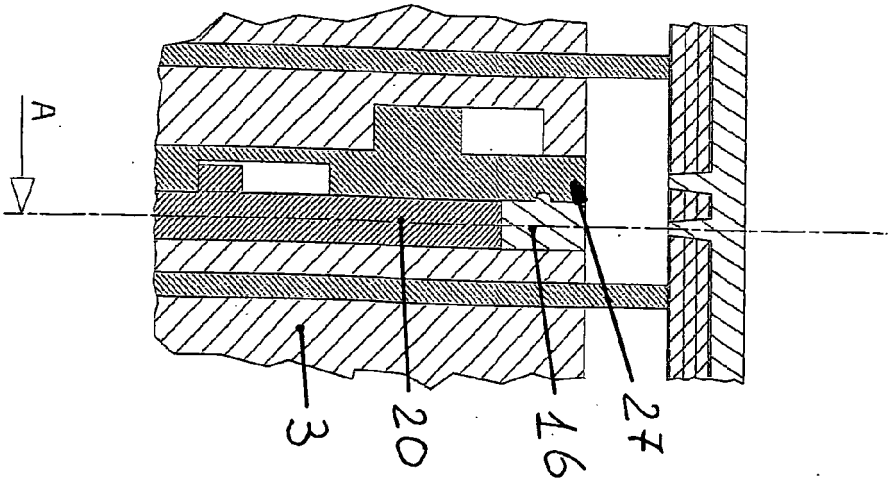


FIG. 9

FIG. 10

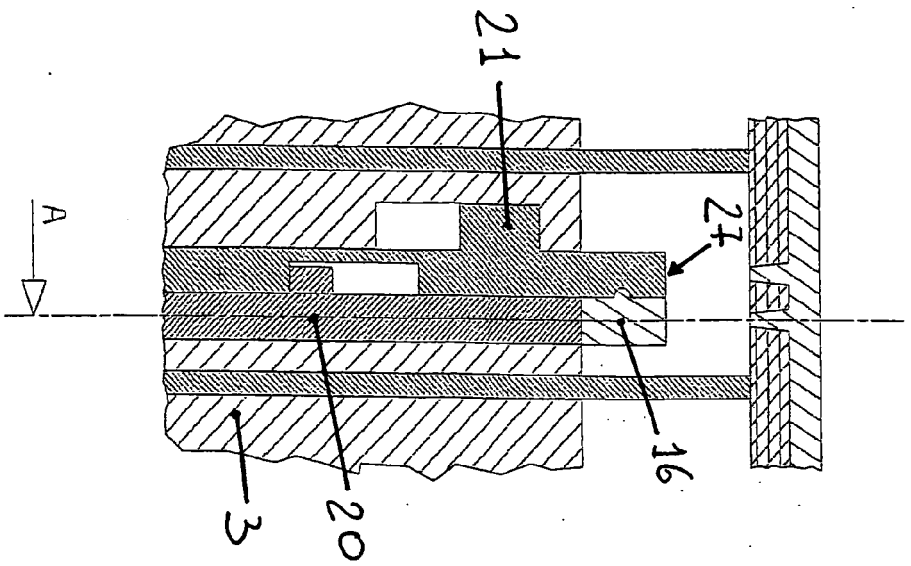
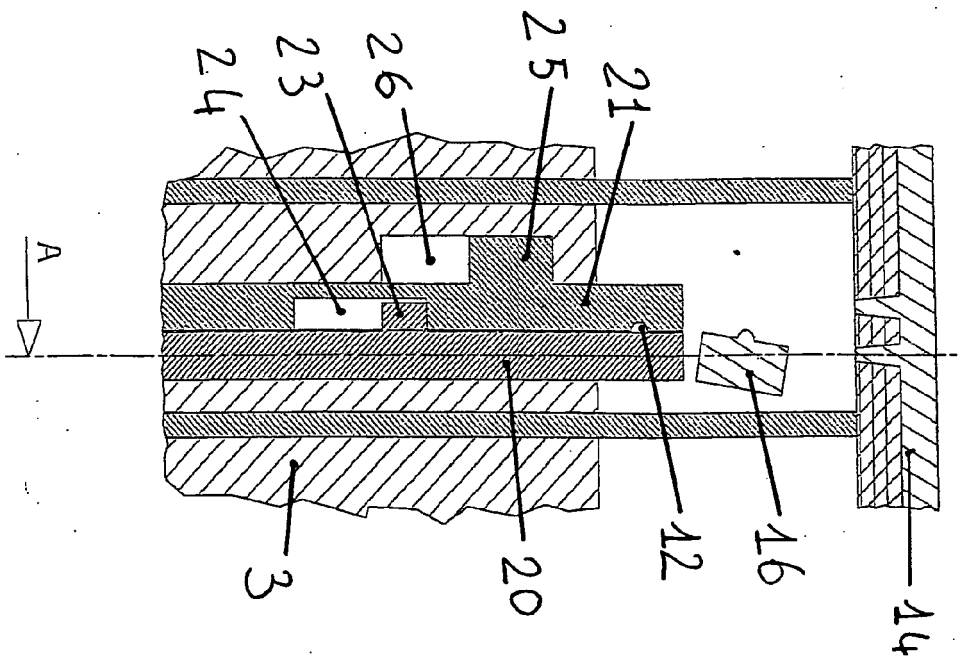


FIG. 11



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EUROPEAN SEARCH REPORT

Application Number
EP 08 00 9583

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			B29C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	10 September 2008	Alink, Maarten

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